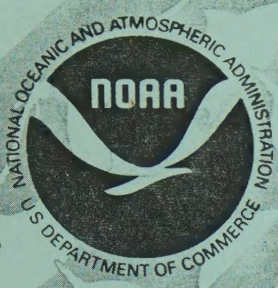


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AERIAL SURVEYS OF PINNIPED
POPULATIONS AT THE CHANNEL
ISLANDS NATIONAL PARK AND
NATIONAL MARINE SANCTUARY:
1984-1985

By

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Aerial Surveys of Pinniped Populations at the Channel Islands National Park
and National Marine Sanctuary; 1984-1985

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Introduction and Methods

Six species of pinnipeds (northern elephant seal, northern fur seal, harbor seal, California sea lion, Steller sea lion, Guadalupe fur seal) use the islands and waters of the Southern California Bight (SCB). Commercial sealing during the 19th and 20th centuries dramatically affected populations of each species and several were locally extinct in the SCB by the turn of the century. Breeding populations of California sea lions, northern elephant seals, northern fur seals and harbor seals in the SCB have increased significantly during the past several decades (e.g., Antonelis et al. 1981, DeMaster et al. 1982, DeLong 1982, Stewart 1983, Cooper and Stewart 1983, Stewart and Yochem 1984b, Stewart et al. MS); the Steller sea lion population has declined in recent years and may now be locally extinct. Sightings of Guadalupe fur seals, on some of the Channel Islands, have increased during the past two decades (Stewart et al., In press). Coincident with increases in species' abundance have been recolonization of historical rookeries and expansion to areas that may not have been used in the past. Further changes in distribution will likely depend on the dynamics of interspecific interactions (among pinnipeds) and the effects of human disturbance (e.g., recreational boating, commercial and sport fishing, aircraft activity, human presence) to rookeries and hauling grounds (those presently used and those of potential, future use).

Determination of the relative abundance of pinnipeds and of the effects of human activities on populations in the SCB requires that trends in abundance and changes in distribution be accurately documented. The proportion of the total population of each species ashore at any time

varies hourly, daily, and seasonally and with meteorological conditions. Analysis of trends in abundance based on counts of all pinnipeds hauled out at a particular time (relative abundance) may therefore require exhaustive interpretation. Extrapolation from relative abundance to estimates of absolute abundance will compound errors, especially when data on the age structure of populations are lacking. Therefore, a parameter such as natality (the total number of births during a season) is often a more reliable index of trends in population abundance. For northern elephant seals, northern fur seals and California sea lions, natality or pup production (the number of newborn surviving to a particular census) has been used as the most practical index of population trends (e.g., DeMaster et al. 1982, 1984; DeLong 1982; Cooper and Stewart 1983). 'Ground counts' appear to be the most reliable method of documenting numbers of pups of these species, although vertical, stereo-photographs taken from fixed winged aircraft may be comparably reliable for some rookeries (e.g., Perryman et al., In press). Oblique aerial photographs (35 mm) appear to underestimate the number of animals ashore (except for harbor seals), especially on large rookeries. The most informative index of harbor seal populations appears to be the number of seals ashore at mid-day in late May or early June when seals are molting (Stewart 1981a, 1984). The most cost-effective method of monitoring pinniped distribution and harbor seal abundance on all Channel Islands appears to be seasonal aerial (35 mm photographs) surveys of hauling grounds and rookeries.

Harbor seals haul out on all islands in the Channel Islands National Park (CINP)/Channel Islands National Marine Sanctuary (CINMS); pups are

born at each island except, perhaps, Santa Barbara Island. Although California sea lions haul-out seasonally at Santa Cruz, Santa Rosa and Anacapa islands, breeding occurs only at San Miguel and Santa Barbara islands (in the CINP/CINMS). Northern elephant seals rarely occur at islands (in the CINP/CINMS) other than San Miguel and Santa Barbara, although two pups were born at Santa Rosa Island in 1985 (Stewart and Yochem, In press).

Ground counts of pups continue to be made for northern elephant seals, northern fur seals, and California sea lions at their rookeries at Santa Barbara and San Miguel islands during studies by various agencies (e.g., NMFS [NWAFC and SWFC], Hubbs Marine Research Institute). The surveys we report here are primarily to document seasonal distribution of breeding and nonbreeding sea lions, fur seals, and northern elephant seals, and seasonal distribution and abundance of harbor seals at the islands of the CINP/CINMS. These surveys were conducted at times that are, biologically, of greatest importance in detecting long-term changes in distribution (Table I).

Surveys were flown in a Cessna 337 at altitudes of 150 m to 170 m. Oblique photographs were made of all pinniped hauling areas and rookeries using an Olympus 35 mm camera, motordrive, 75-250 zoom lens and high speed (200 ASA or 400 ASA) color slide film.

Counts of pinnipeds were obtained by projecting processed slides on a large viewing screen and scoring each area for total numbers of pinnipeds present. Distribution of pinnipeds was coded by area designation similar

to those of previous studies (Bonnell et al. 1980; Stewart 1981b, 1982a, 1982b; Stewart and Yochem 1984a, 1984b; see Appendix I, this report).

Results and Discussion

Harbor seal (Phoca vitulina richardsi)

Harbor seals haul out at all islands in the CINP/CINMS, and give birth at all islands except, perhaps, Santa Barbara Island. Numbers of seals hauled out are greatest at San Miguel Island and Santa Rosa Island (Tables II and III). Santa Cruz Island (Table IV) hosts the third largest population, followed by Anacapa (Table IV) and Santa Barbara islands. Harbor seals were not observed hauled out at Santa Barbara Island during the July and January 1984 surveys but 19 seals were observed in January 1985.

Seals commonly use a limited number of areas ('traditional sites') -- beaches, inshore rock ledges, and offshore reefs -- at each island on an annual basis. The total number of these sites used simultaneously varies seasonally, however (Stewart and Yochem MS). Of seals observed in April, pups accounted for 9% of those at San Miguel Island, 13% of those at Santa Rosa Island, 17% of those at Santa Cruz Island and 13% of those at Anacapa Island. One hundred and seventy-six pups were observed at all islands in April, representing about 12% of all seals observed then.

Northern Elephant Seal (Mirounga angustirostris)

San Miguel Island is the largest rookery for northern elephant seals in the Southern California Bight and may now be the largest rookery in the

species' range (Stewart, unpubl. data). A small number of pups are born at Santa Barbara Island (Table VII) and a smaller number of seals occur there outside the breeding season (13 males and 2 juveniles were seen there during the July survey). Two pups were born at Santa Rosa Island in January 1985 (Stewart and Yochem, In press).

San Miguel Island: Rookeries often occur at Adams Cove, South Cove, West Cove, Northwest Cove, Landing Cove, Tyler Bight and at most accessible beaches east and west of Crook Point and at Cardwell Point (Tables V and VI). The number of pups born at all of these beaches increased in 1985, especially on the south coast (Stewart, unpubl. data). In April, most molting juveniles and females used beaches at Tyler Bight, near Crook Point, and at South Cove. In July, most molting males were found at South and West coves and at Tyler Bight.

Santa Barbara Island: Elephant seals haul out and breed at only a few small beaches at Santa Barbara Island (Table VII). Limited beach space and the effects of high tides and storms on these narrow, steep-backed beaches dramatically influence the numbers and breeding success of elephant seals at Santa Barbara Island.

California sea lion (Zalophus californianus)

Although California sea lions were observed at all islands, breeding is still apparently restricted to San Miguel (SMI) and Santa Barbara (SBI) islands (Tables VIII through XIII). Numbers of sea lions ashore at SMI and SBI are greatest in early July at the height of the breeding season. Numbers decline through autumn and winter, and are lowest in January,

increase in April and May but decline briefly in late May just prior to the breeding season.

At SMI nearly all breeding animals use the beaches and rocky headlands at Point Bennett and a few pups are born along the coastline of Castle Rock. Sea lions that haul out at Tyler Bight in summer are primarily bachelor males, subadult males, juveniles, and non-parous females although a few pups are born at East Judith Rock Beach (Area 161) and in area 150 (Table IX). In 1984, most pups were born at South Cove, West Cove, and Northwest Point. We did not observe pups at Richardson Rock although there were sea lions hauled out there.

The breeding population of California sea lions at SBI remains small with most pups born along short sections of the west and southeast coastlines (Table XIII). We counted about 1200 sea lions (including 277 pups) at SBI during the July survey. Few sea lions were observed hauled out during the January surveys in 1984 and 1985; most that were hauled out then were along the southeast and northwest coasts. We observed small numbers of sea lions at Santa Rosa Island (301 sea lions were observed hauled out near Ford Point on 28 January 1984), Santa Cruz Island (Tables X and XI; sea lions were observed at Fraser Point, near Painted Cave, near Potatoe Harbor, and at Gull Island) and at Anacapa Island, East Island (Tables X and XI), during several of the seasonal surveys. We did not observe pups among the sea lions hauled out at East Anacapa Island or at Gull Island (Santa Cruz Island) during the July 1984 survey. The presence of adult males as well as what apparently were adult females at Gull Island during the summer breeding season in 1984, however, suggests that a few

pups may occasionally be born here and that a small breeding colony could become (re)established here in the future; Gull Island was apparently used historically by breeding California sea lions (Bonnot 1928, Rowley 1929).

Northern fur seal (Callorhinus ursinus)

Within the SCB, northern fur seals presently come ashore only at San Miguel Island (Point Bennett) and at Castle Rock (Table XIV). We observed fur seals at Castle Rock during each survey although fur seals were seen at Adams Cove only in summer 1984 and in January 1985. We counted approximately 1100 fur seals on the two rookeries on 14 July, about 58% of which were at Adams Cove.

Steller sea lion (Eumetopias jubatus)

We did not observe any Steller sea lions at San Miguel Island or at Richardson Rock during the July 1984 survey. We did, however, see several apparently fresh sea lion carcasses in a small cove on the north side of Castle Rock where a male Steller sea lion has been present in previous years (DeLong 1982). That male frequently killed California sea lions during most breeding seasons when he attempted to copulate with them (DeLong 1982). Our observations of several fresh carcasses in 1984 suggests that a male Steller sea lion may have been present at Castle Rock during the 1984 breeding season.

Guadalupe fur seal (Arctocephalus townsendi)

We did not observe any Guadalupe fur seals at San Miguel Island during the July survey. A subadult male was, however, seen there in August by ground observers (Stewart et al., In press).

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Table I. Dates and times of aerial surveys flown in 1984 and 1985.

Survey No.	Date	Time of Survey				
		San Miguel	Santa Rosa	Santa Cruz	Anacapa	Santa Barbara
I	28 January 1984	1130-1155	1106-1129 1157-1205	1053-1102 1208-1234	1240-1247	1339-13
II	28 April 1984	1357-1414	1334-1354 1415-1421	1309-1330 1424-1437	1303-1306 1439-1442	Not surveye
III	14 July 1984	1357-1425	1332-1354 1428-1437	1306-1328 1440-1459	1300-1304 1501-1505	1236-12
IV	26 January 1985	1024-1042 1220-1224	1002-1022 1044-1049	0937-0957 1053-1105	0932-0935 1107-1110	1124-11

Table II. Distribution of harbor seals at San Miguel Island, 1984-1985

Area	Survey I 28 January 1984		Survey II 28 April 1984		Survey III 14 July 1984		Survey IV 26 January 1985	
	Total	Pups	Total	Pups	Total	Pups	Total	Pups
102								
111								
112								
113								
114								
115								
116								
117								
118								
119								
120								
122			110	11	135		39	
123	18		52	3				
130	2		139	25	80		66	
141								
142			34	8	51		47	
144			92	20			14	
145								
146	8		64	16	106			
147								
150			6	2				
161								
160								
171								
172					1			
173								
TOTAL	28		497	45	373		166	

Table III. Distribution of harbor seals at Santa Rosa Island, 1984-1985.

Area	Survey I 28 January 1984		Survey II 28 April 1984		Survey III 14 July 1984		Survey IV 26 January 1985	
	Total	Pups	Total	Pups	Total	Pups	Total	Pups
610								
611								
612							23	
613					21			
614	35		15	6				
615			211	22	44		19	
616								
617								
618								
619	52		53	6				
621	31		200	20	8		23	
622								
624	1		7		35			
625	21		96	11	108		38	
626	6		80	20				
629	8				5			
Total	154		668	85	306		103	

Table IV. Distribution of harbor seals at Santa Cruz and Anacapa islands, 1984-1985.

Area	Survey II 28 January 1984		Survey II 28 April 1984		Survey III 14 July 1984		Survey IV 26 January 1985	
	Total	Pups	Total	Pups	Total	Pups	Total	Pups
<u>Santa Cruz Island</u>								
641	2							
643	7		50	8			11	
645	1		9	1	5		5	
646	7							
647	5		20	3			10	
648								
649								
653			69	3	41		13	
654	4		49	11				
656	50							
658			87	12			37	
Total	76		225	38	46		76	
<u>Anacapa Island</u>								
660	2		26	2	40			
670	34		38	4	29			
680	47		62	2	10		2	
Total	83		126	8	79		2	

Table V. Distribution of northern elephant seals at San Miguel Island, 1984-1985; Surveys I and IV.

Area	Survey I 28 January 1984				Survey IV 26 January 1985			
	Adult females	Pups	Males	Other	Adult females	Pups	Males	Other
102								
111	1315	842	127		2340	2000	230	
112								
113	695	542	57		1020	850	120	
114	189	151	24		140	115	20	
115	12	6	5		2		12	
116	256	156	94		610	580	101	
117								
118			32		15	12	28	
119							5	
120	53	29	30		49	40	16	
122	45	31	2		42	39	4	
123	23	15	10		7	5	6	
130	1		1				1	
141								
142					1	1	2	
144								
145	37	26	13		57	42	16	
146	800	568	62		846	715	101	47
147	526	429	66		555	524	78	29
150	1093	786	111		752	739	125	35
160			4					
161	27	18	8		35	28	4	
171								
172	9	5	1		6	2	4	
173			7					
Total	5081	3604	654		6477	5577	951	111

Table VI. Distribution of northern elephant seals at San Miguel Island, 1984-1985; Surveys II and III.

Area	Survey II 28 April 1984	Survey III 14 July 1984
	Adult Females and Juveniles	Males
102		
111	359	113
112		
113	1929	624
114	115	248
115		
116	252	316
117	149	
118	257	
119		
120		
122	327	24
123	76	
130	2	
141		
142		
144		
145		
146	1960	59
147	741	116
150	2957	250
160	35	
161	137	37
171		
172	38	3
173	43	
Total	9377	1790

Table VII. Distribution of northern elephant seals at Santa Barbara Island, 1984-1985; Surveys I and IV.

Area	Survey I 28 January 1984			Survey IV 26 January 1985		
	Adult Females	Pups	Males	Adult Females	Pups	Males
302	10	6	4	20	11	2
303						
304	7	4	1	4	1	1
305	3	3	1			
306						
307						
308	60	50	4	75	50	3
309						
310						
311						
312						
313						
314						
315	5		1	16	10	2
316						
317						
318						
322			1			
323						
324						
325						
Total	85	63	12	115	72	8

Table VIII. Distribution of California sea lions at San Miguel Island, 1984-1985; Surveys I and IV.

Area	Survey I 28 January 1984			Survey IV 26 January 1985		
	Males	Adult Females and Others	Pups	Males	Adult Females and Others	Pups
Castle Rock) 102		38			160	
Hardson Rock)103					48	
111		165			125	
112					68	
113		456			650	
114		245				
115		658			797	
116		229			250	
117		143			117	
118		620			400	
119		118			360	
120						
122						
123						
130						
141						
142						
144						
145						
146						
147						
150		320			156	
160		165			93	
161		45			195	
171						
172					60	
173		25			85	
Total		3227			3564	

Table IX. Distribution of California sea lions at San Miguel Island, 1984-1985; Surveys II and III.

Area	Survey II 28 April 1984			Survey III 14 July 1984		
	Males	Adult Females and Others	Pups	Males	Adult Females and Others	Pups
(Castle Rock) 102		198		8	144	17
(Richardson Rock) 103				18	169	
(Adams Rock) 111		456		148	992	783
112		157		10	186	65
(South Cove) 113		1845		47	1638	1038
114		150		12	126	60
115		965		39	815	671
(West Cove) 116		820		23	1692	1335
(Northwest Point) 117		645		19	1251	1078
(Northwest Cove) 118		315		28	921	828
119		88		8	277	64
120				5		
122				65		
123						
130						
141						
142						
144						
145						
146						
147						
150		395		273	447	14
160		124		4	127	11
161		140		5	200	4
171				7	80	29
172						
173				3	33	25
Total		6298		722	8211	6022

Table X. Distribution of California sea lions at Santa Cruz and Anacapa islands, 1984-1985; Surveys I and IV.

Area	Survey I 28 January 1984			Survey IV 26 January 1985		
	Males	Adult Females and Others	Pups	Males	Adult Females and Others	Pups
<u>Santa Cruz Island</u>						
641		3				
643		4				
645						
646						
647						
648						
649						
653						
654						
655					15	
656						
658						
Total		7			15	
<u>Anacapa Island</u>						
660						
670						
680		169			43	
Total		169			43	

Table XI. Distribution of California sea lions at Santa Cruz and Anacapa islands, 1984-1985; Surveys II and III.

Area	Survey II 28 April 1984			Survey III 14 July 1984		
	Males	Adult Females and Others	Pups	Males	Adult Females and Others	Pups
<u>Santa Cruz Island</u>						
641						
643						
645					4	
646						
647						
648		393				
649						
653						
654						
655				3	55	
656						
658						
Total		393		3	59	
<u>Anacapa Island</u>						
660						
670						
680		109		2	30	
Total		109		2	30	.

Table XII. Distribution of California sea lions at Santa Barbara Island, 1984-1985; Surveys I and IV.

Area	Survey I 28 January 1984			Survey II 26 January 1985		
	Males	Adult Females and Others	Pups	Males	Adult Females and Others	Pups
301		16				
302		34				
303					54	
304		23			39	
305		29			185	
306						
307						
308						
309						
310						
311						
312						
313						
314						
315		6				
316						
317		8			158	
318						
322		67			35	
323						
324						
325					25	
Total		183			496	

Table XIII. Distribution of California sea lions at Santa Barbara Island, 1984-1985; Survey III.

Area	Survey III 14 July 1984		
	Males	Adult Females and Others	Pups
301			
302	7	93	25
303			
304	13	166	50
305			
306			
307	2	11	
308	4	77	34
309			
310	1	10	
311			
312	1	23	4
313	1	7	
314	2	50	5
315	1	5	1
316	3	103	51
317	6	146	43
318	2	26	11
322	5	137	53
323			
324	1	1	
325			
Total	49	855	277

XIV. Distribution of northern fur seals at San Miguel Island, 1984-1985.

Area	Survey I 28 January 1984		Survey II 28 April 1984	Survey III 14 July 1984			Survey IV 26 January 1985
	Males	Adult Females and Others		Males	Adult Females and Others	Pups	
Se Rock) 102	7	4	51	22	19	244	90
Cove) 111				8	290	324	11
Total	7	4	51	30	480	568	101

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Appendix I. Summary of BLM codes for islands in the Channel Islands
National Park/Marine Sanctuary (from DeMaster and Wing 1984).

SUMMARY OF BLM CODES USED IN PINNIPED CENSUSES

The following list of figures should be used in referencing hauling sites within the Channel Islands National Park. These codes were developed by researchers from the University of California, Santa Cruz, for a contract on marine mammal distribution in southern California (1976-1978) to the Bureau of Land Management (BLM). It is only by using consistent location codes that an efficient reporting system can be developed and maintained.

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Figure 4. Summary of BLM codes for Santa Cruz Island.

Figure 5. Summary of BLM codes for Anacapa Island.

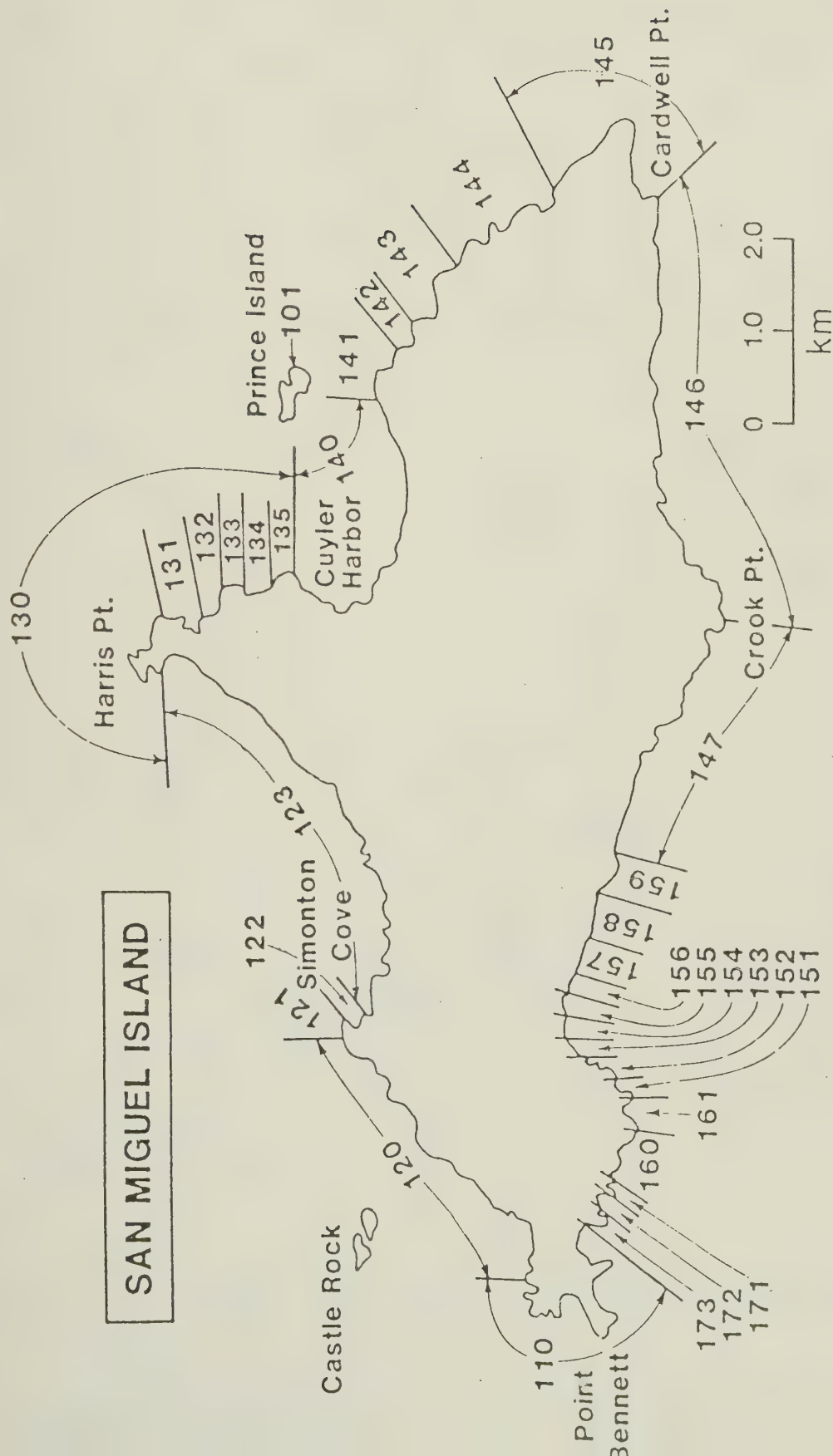


Figure 1. Summary of BLM codes for San Miguel Island.

SANTA BARBARA ISLAND

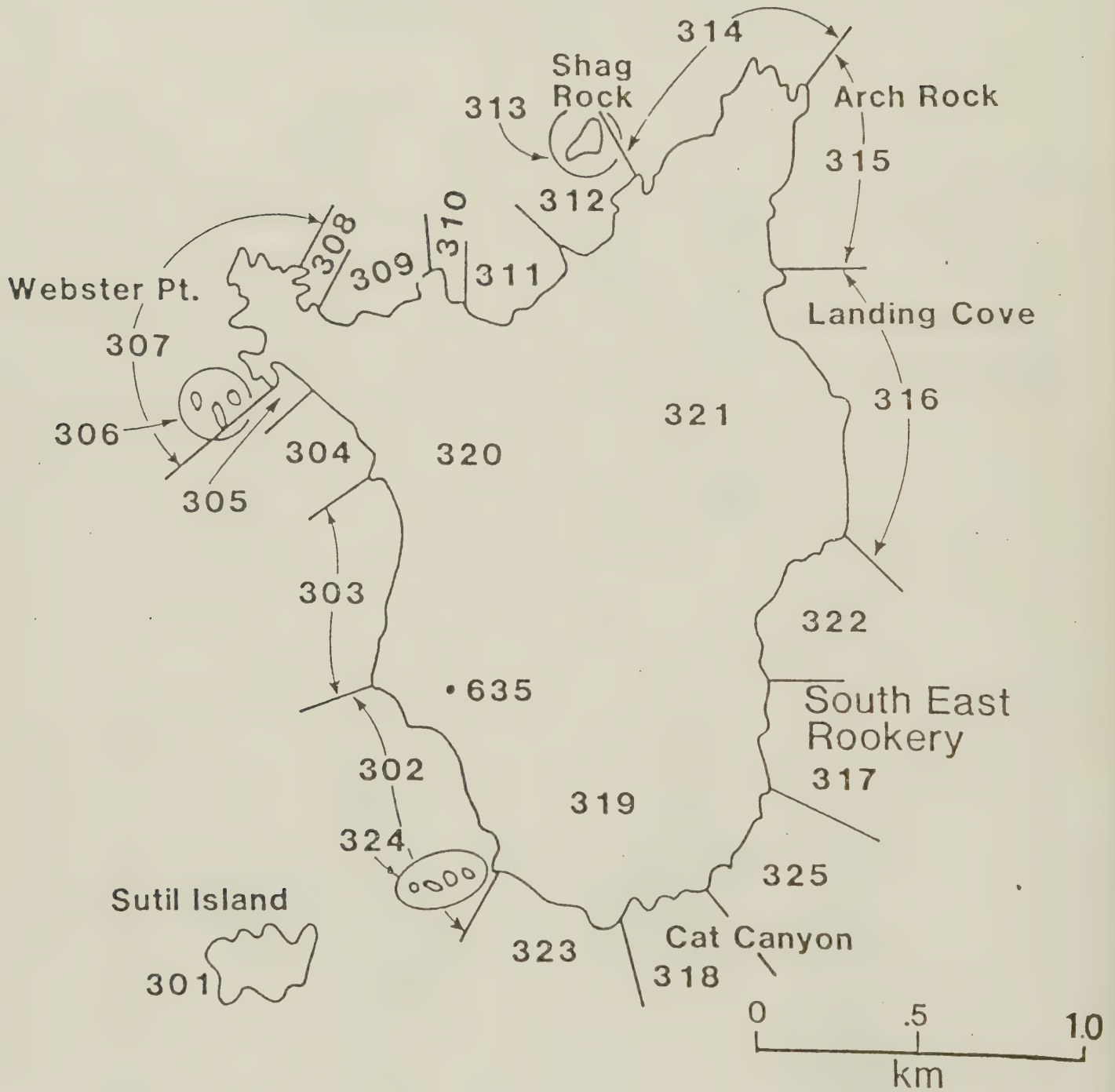


Figure 2. Summary of BLM codes for Santa Barbara Island.

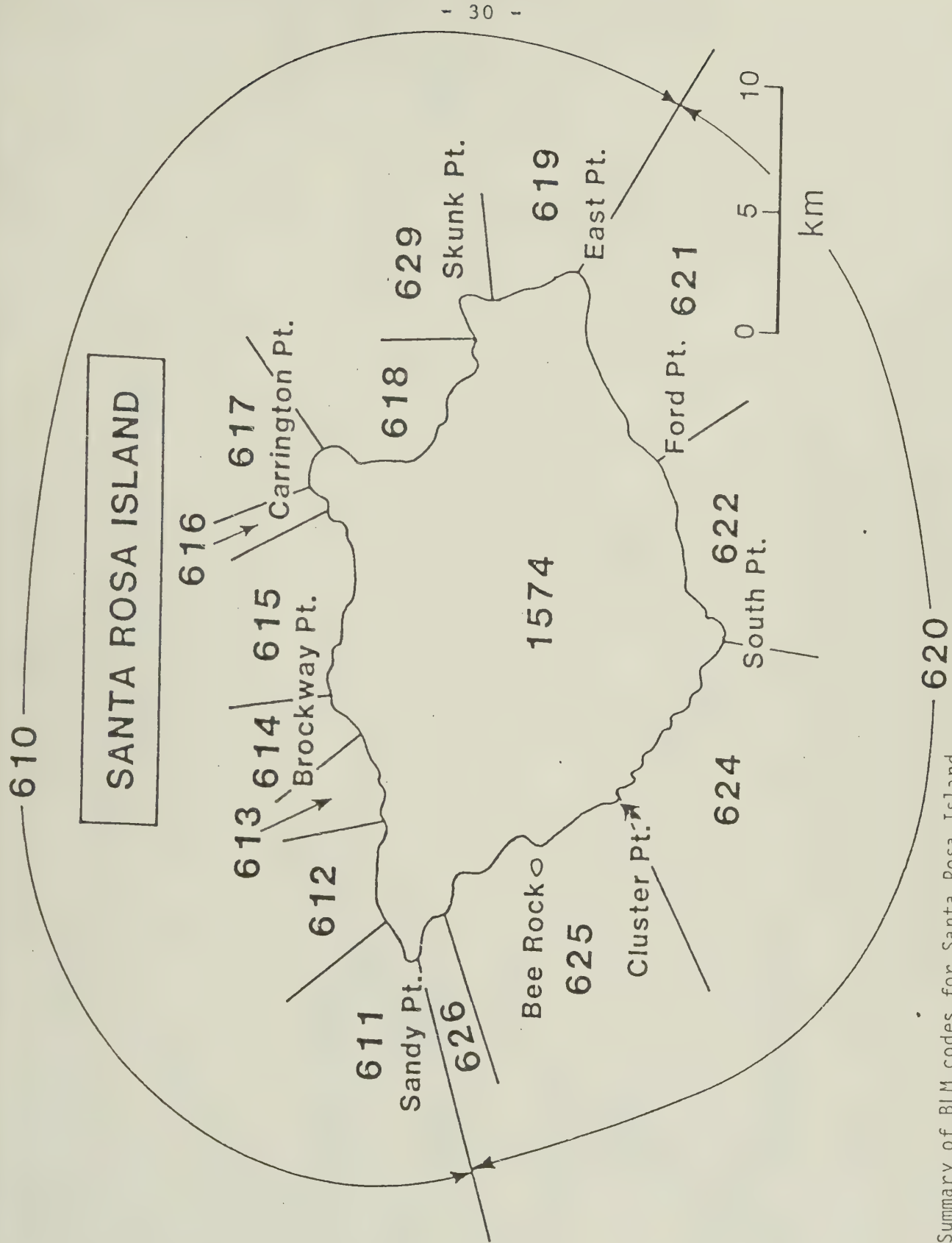


Figure 3. Summary of BLM codes for Santa Rosa Island.

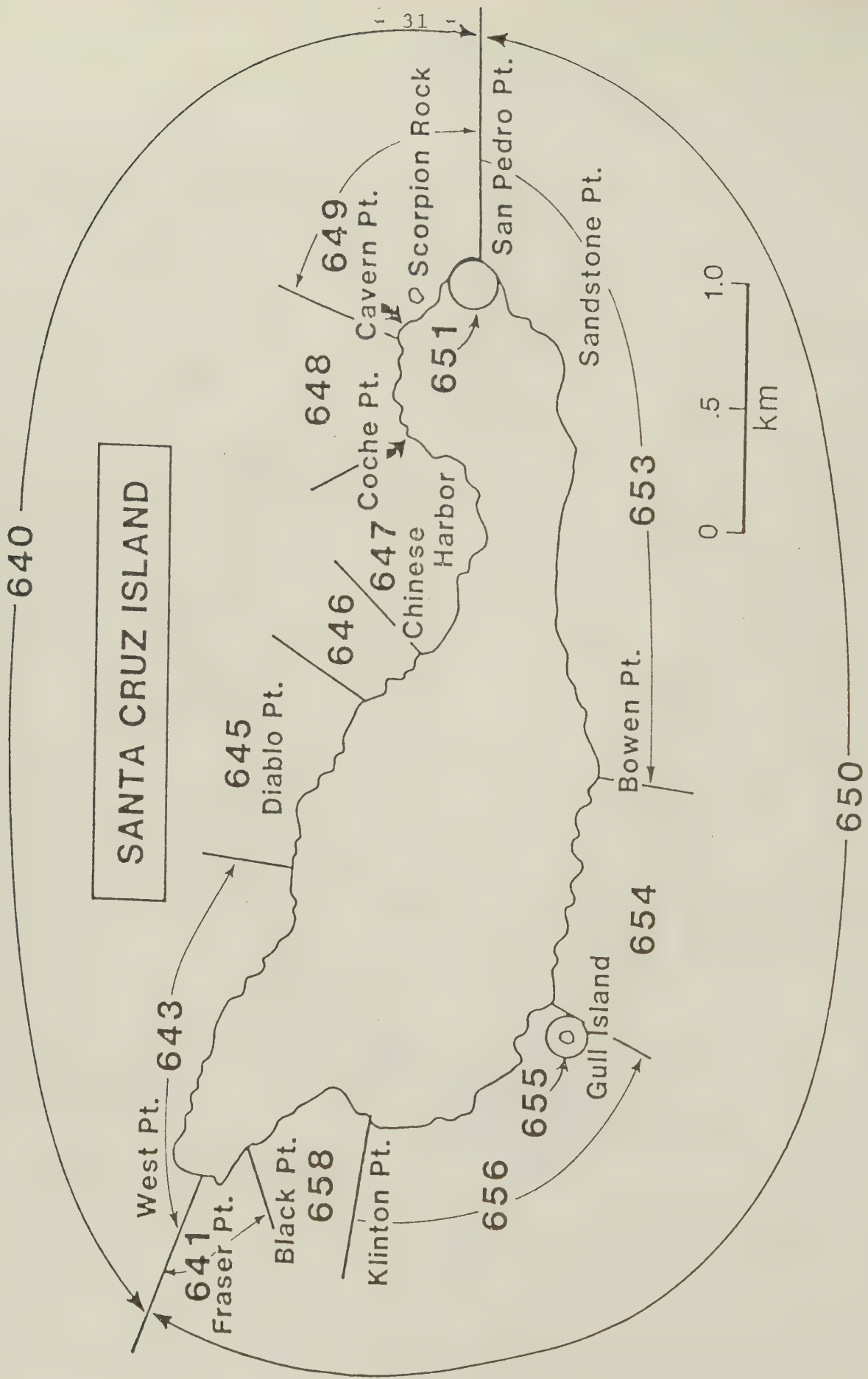


Figure 4. Summary of BLM codes for Santa Cruz Island.

ANACAPA ISLAND

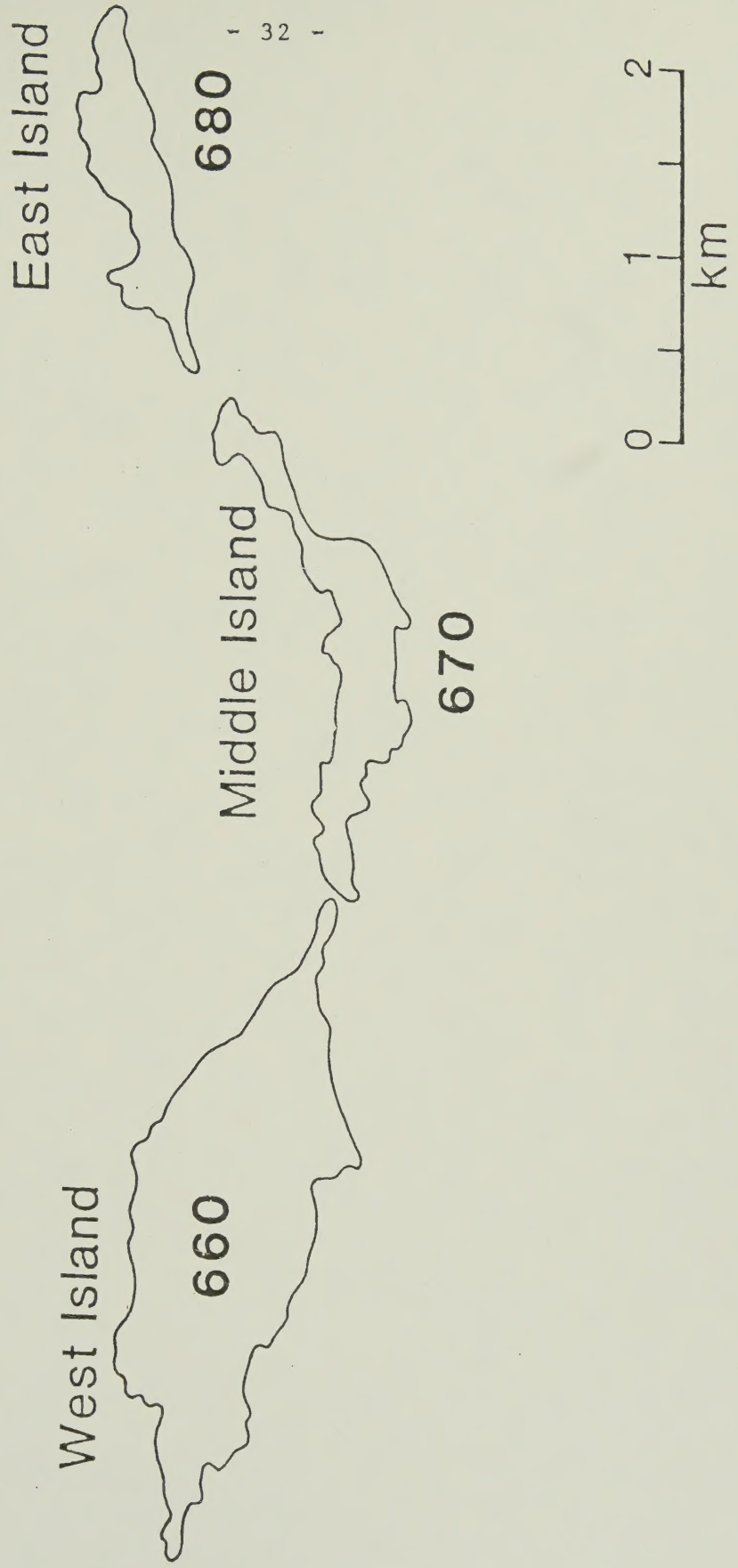
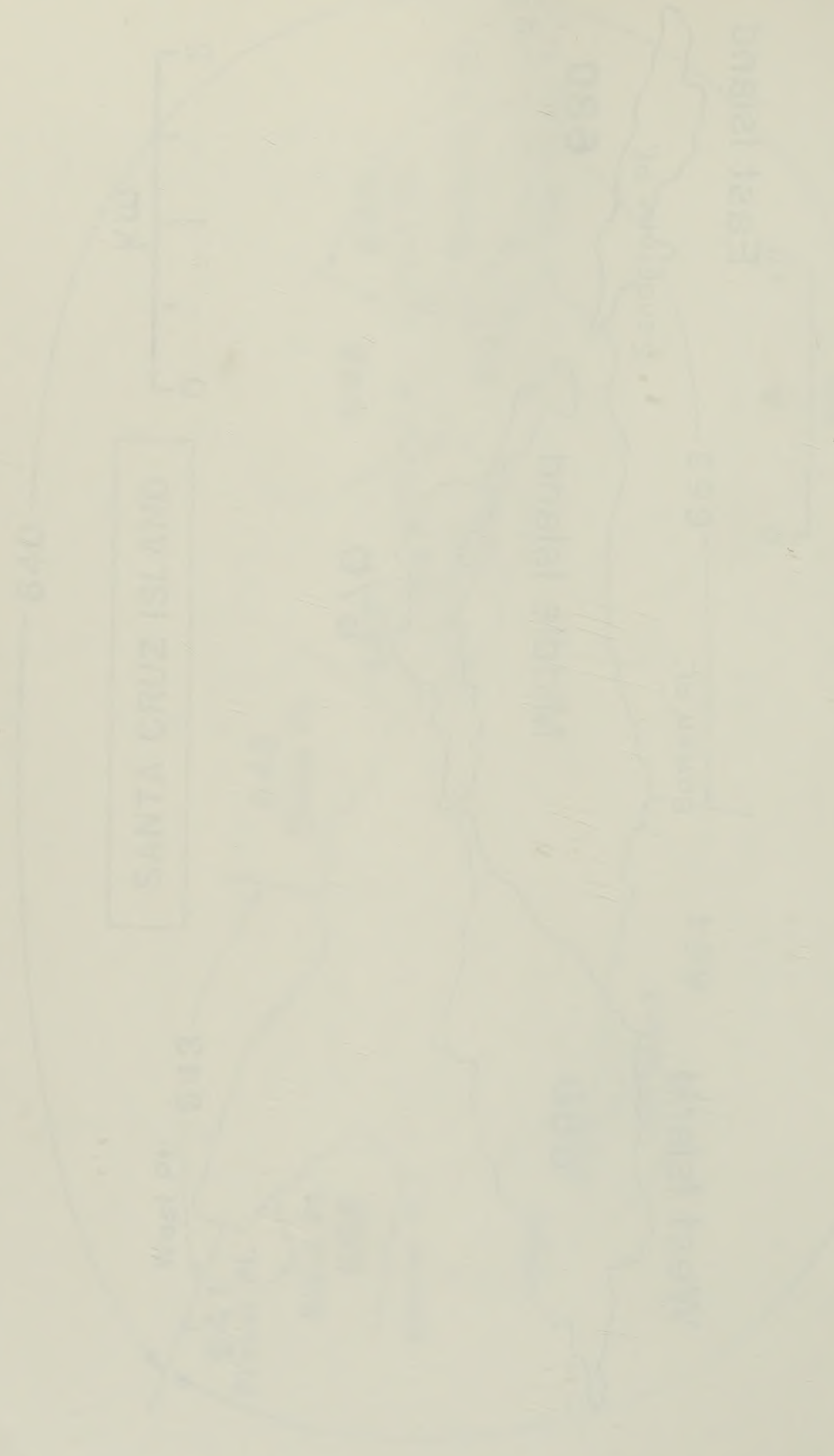


Figure 5. Summary of BLM codes for Anacapa Island.

Map of Santa Cruz Island, showing the location of the station.



SANTA CRUZ ISLAND

Station



